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ABSTRACT

Previous research on communication apprehension has revealed a reduction in student apprehension over a semester-length course in speech communication. Further research indicates, however, that, while most students do experience a reduction, a sizable percentage actually report an increase. This study sought to determine the difference between those individuals who report a decrease and those who report an increase. Discriminant analysis of 34 possible predictors revealed 12 significant discriminators. (Author)

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THE PREDICTION OF LONG-TERM CHANGES IN COMMUNICATION APPREHENSION IN THE COMMUNICATION CLASSROOM

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Abstract: Previous research on communication apprehension has revealed a reduction in student apprehension over a semester length course in speech communication. Further research indicates, however, that while most students do experience a reduction, a sizable percentage actually report an increase. This study sought to determine the difference between those individuals who report a decrease and those who report an increase. Discriminant analysis of thirty-four possible predictors revealed twelve significant discriminators.

A paper prepared for the annual convention of the Speech Communication Association, Washington, D.C., December 1-4, 1977

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THE PREDICTION OF LONG-TERM CHANGES IN COMMUNICATION APPREHENSION IN THE COMMUNICATION CLASSROOM

Introduction and Rationale

During recent years, extensive work concerning the correlates and consequences of communication apprehension has specified a number of interesting and significant relationships between the avoidance reaction to communication encounters and a variety of social, psychological, and academic decisions and evaluations (Daly, 1975; McCroskey, 1975; Phillips, 1968; Phillips and Metzger, 1973). For example, individuals with high apprehension tend to be perceived less positively than those with low apprehension by teachers (McCroskey and Daly, 1976), peers (Daly, McCroskey and Richmond, 1976; McCroskey, Daly, Richmond and Cox, 1976), interviewers (Daly and Leth, 1976), subordinates (Daly, McCroskey and Falcione, 1976) and indeed themselves (McCroskey, Daly, Richmond and Falcione, 1977). They select majors in college and occupations in adulthood which seem to "fit" their level of apprehension (Daly and McCroskey, 1975; Daly and Shamo, 1977) and which are often associated with lower income levels (Bruskin, 1973). High apprehension is associated with lower interaction behavior in small group discussions (Wells and Lashbrook, 1971), seating positions which do not require high vocal activity (McCroskey and Lepard, 1975), lower levels of self disclosure (Hamilton, 1972), poor performance in classes where oral communication activities are required and valued (McCroskey and Anderson, 1976), feelings of isolation and seclusiveness (Phillips, 1968), lowered trust in others (Low, 1951; Giffin and Heider, 1967), and lower standardized achievement test scores throughout their elementary and secondary education and a college GPA, accross all courses taken, that is

approximately one-half grade point lower than that of their peers (McCroskey, 1977). Very simply, oral communication apprehension appears to be a significant and widespread social disability.

Despite the nature, consequences, and extent of communication apprehension, the scholarly interest concerning its treatment has taken a distinctly clinical orientation emphasizing therapeutic approaches such as systematic desensitization (Kondas, 1967; Lang and Lazowik, 1963; McCroskey, 1972), insight and rational-emotive therapy (Meichenbaum, Gilmore and Fedoravicious, 1971; Trexler and Karst, 1972), counseling and sensitivity training (Phillips and Metzger, 1973; Giffin and Bradley, 1969), hypnosis (Barker, Cegala, Kibler, and Wahlers, 1972) and biofeedback (Borkovec, Wall and Stone, 1974; Motley, 1974). While all approaches appear to have positive effects on individuals with high and chronic apprehension in specified settings, no extensive explication exists of the significant intervening characteristics of the various treatments that cause the modification in subject apprehension. Additionally--and even more impractically--none of these procedures provides explicit methods for the classroom teacher to treat highly apprehensive individuals throughout an extended academic period without isolating those individuals for measurement and therapy.

Although development of the various classroom techniques for reducing apprehension has been neglected, it is known that something significant <u>does</u> occur in the communication classroom to reduce average apprehension (Baker, 1964; Dymacek, 1971; Furbay, Hedges and Markham, 1966; Furr, 1970; Gilkinson, 1941; Gruner, 1964; Hargis, 1956; Henrickson, 1943; Judd, 1971; Knower, 1938; Lerea, 1956; McCroskey, 1970; Miyamoto, Crowell and Katcher, 1956; Moore, 1935;

Paulson, 1951; Robinson, 1955; Rose, 1940; Sikkink, 1955). The word average is used since, while most students experience some decrease in apprehension, some report an increase over the academic period (Brooks and Platz, 1968; Phillips and Metzger, 1973).

What exactly occurs within the communication classroom to affect students' apprehension level is relatively unknown. Existing research suggests that practice, understanding and liking for oral communication skills, better understanding of self, healthier social adjustment, and perceived attitudes of instructors and classmates may all play a role (Gruner, 1964; Henrickson, 1943; Knudson, 1940; Dymacek, 1971; Sikkink, 1955; Paulson, 1971), but the relative and cumulative contribution to modification in apprehension level by these elements is unknown. In addition, a variety of other predictors might also have some effect. The present research report, an extensive investigation into some of the causal agents for the modification of communication apprehension in the basic communication course, sought to determine important differences between those individuals who experience a reduction in their apprehension over a semester and those who alternatively report an increase.

Method

Subjects. Undergraduate students (n = 1,063) enrolled in the basic communication course at a large midwestern university served as respondents in this study. The total reflects only those individuals who completed both the pre- and post-test. An attrition rate of approximately 4 percent over the semester was accounted for by those individuals who failed to complete either or both measures, failed to attend class the day any measure was administered, or who dropped from the course anytime during the semester.

The course the students were enrolled in was a survey-skills course comprising four general units. The first--an overview of basic communication principles--included models, perceptions, nonverbal communication, and semantics. The second-through-fourth units emphasized performance on interviews, small-group discussions, and public speaking, respectively.

Procedures. Respondents completed two questionnaires over the length of an academic semester. The first questionnaire was administered in class by the individual section instructors during the first week of classes; the second, also administered by instructors, was completed in class during the fourteenth week of the semester. Respondents were asked to complete both questionnaires as part of a general survey on communication attitudes and variables which might influence communication feelings. Although subjects were guaranteed that their responses would remain confidential, it was obviously necessary to ask them to indicate some identification so that pre- and post-measures could be collected and grouped accurately. Subjects thus provided their section numbers and the last four digits of their social security numbers. Individual instructors were not provided any information on the apprehension level of any individual or the class as a whole. This hopefully prevented instructors from performing any unusual activities that might affect apprehension other than those normally used in their classes. The large majority of instructors were graduate teaching assistants ranging in experience from their first semester of teaching to several years in both the secondary and college levels.

Measurement. Both questionnaires contained a measure of communication apprehension (McCroskey, 1970). In addition, the questionnaires contained a

variety of questions dealing with the respondents characteristics (i.e., sex, age, race, major), pre-classroom experiences (i.e., interaction with family and peers, communication activities, prior speech communication classwork), and classroom experiences (i.e., instructor characteristics, number of speeches given, expectation of success in the class). The items used in these measures were developed from three sources. First, some of the items were based upon previous research (e.g., perceived attitude of instructors and the number of speeches performed). Second, ten individuals who have completed major research projects on communication apprehension were polled on what they felt might be significant contributors to the reduction or increase in apprehension in the communication classroom. Third, students enrolled in a similar course were asked, as part of a classroom assignment, to list variables which they felt might have some effect. After eliminating redundant and irrelevant items from consideration, a list of questions was composed. These are listed in Table 1. Items 1 through 14 were administered at the beginning of the semester; items 15 through 34 were given at the end.

Place Table 1 about here

Data Analysis. Respondents' scores on the measure of communication apprehension were computed for each administration using a simple additive formula as recommended (McCroskey, 1970, 1975). Reliabilities were computed for each administration period. The alpha coefficient for the first administration was .927; for the second administration .922. Both of these reliabilities were deemed sufficiently high to accept the instrument as reliable. A change score was computed for each individual by subtracting his or her score on the second

administration from the score obtained on the first administration of the questionnaire. The overall reduction in apprehension from the beginning of the semester ($\bar{X}$ = 74.503, sd = 15.455) to the end of the year ($\bar{X}$ = 69.315, sd = 14.475) was approximately five scale units. This difference, tested by a t-test for correlated samples, was highly significant ($t(1062) = 16.69$, $p < .00001$) and supported previous findings of an average reduction in apprehension over a semester of coursework in communication. An inspection of the distribution of change scores, however, revealed that despite an overall reduction in apprehension, a sizable number of students reported an increase. Indeed, 29 percent of those included in the sample experienced some increase in apprehension. This percentage is quite similar to that found in an earlier study employing a different measure of apprehension (Brooks and Platz, 1965).

The distribution of change scores was approximately normal (skewness = .389; kurtosis = .814). To establish groups of individuals who could be categorized as experiencing significant increases and decreases in apprehension over the semester, the standard deviation of the change scores was computed (sd = 10.136). Individuals whose scores exceeded one standard deviation above or below the mean change score ($\bar{X}$ = 5.188) were classified as experiencing a significant decrease or increase respectively in apprehension. Two groups were thus created: one (n = 165) included those individuals who reported an increase in apprehension; the other included those who reported a decrease (n = 165). The remaining individuals' responses were dropped from further analysis.

Subsequent to this categorization a stepwise discriminant analysis was performed. Discriminant analysis seeks to maximize the differences

between groups on the variables included as predictors; in this case those included in Table 1. This maximal separation of groups is accomplished by the computation of a set of discriminant weights that, when linearly combined, differentiates the two groups better than any other linear combination. The stepwise procedure selects initially the single best discriminating variable in terms of the greatest minimization of Wilk's lambda. This is equivalent to selecting the variable which maximizes the overall multivariate F ratio for differences between group centroids. A second variable is then selected from the remaining variables using the criterion that it would best improve the multivariate F ratio in combination with the first. The procedure continues until either all variables are included or the addition of another variable will contribute only a negligible amount to prediction. After the discriminant weights were computed, two additional steps were taken. First, a measure of the total discriminatory power of the discriminant function was found. This measure, equivalent conceptually to the univariate omega squared value (Hays, 1963), was computed as:

$$\frac{/T/ \; /W/ \; \frac{k-1}{N-k} \; /W/}{/T/ \; \frac{1}{N-k} \; /W/}$$

where N represents the total sample size, k the number of groups, /W/ the determinant of the within-groups sums of squares and cross products matrix, and /T/ the determinant of the total sums of squares and cross products matrix (Tatsuoka, 1970). Second, a test of the classificatory ability of the discriminant function was computed using the respondents' answers. A percentage figure of correct classifications as well as a goodness-of-fit chi-square value was obtained. As a final step, the significant ($p < .20$) classificatory variables

in terms of contribution to discrimination, as determined by Rao's V statistic, were re-analyzed in an attempt to purify the discriminant function. Rao's V statistic is a generalized distance measure. The larger the value of V, the greater the distance between groups (a generalization of Mahalanobis D^2 statistic). The change in V after each addition was computed and used as the criterion for significant contribution. This criterion is equivalent to Hotelling's trace statistic, the use of which has often been proposed for variable selection (e.g., Miller, 1962). Essentially all variables that did not significantly discriminate the groups were deleted from the second analysis. The same tests were recomputed. The question involved was, Is it possible to derive a more parsimonious function in terms of number of variables without significant loss in terms of prediction accuracy or variance accounted for?

Two special notes should be made about the procedures used. First, since we are dealing with only two groups, the discriminant weights are proportional to multiple regression weights (Tatsuoka, 1971; Kerlinger and Pedhazur, 1973). Interpretation is similar. This is, of course, limited to the special case of two groups. In multi-group cases the reduction does not apply. Instead, when discriminant analysis includes more than two groups, it reduces to canonical correlation analysis. Second, when examining the predictive nature of the discriminant function, caution must be exercised since the same sample which defined the discriminant weights is being classified by the function. This admittedly is a liberal procedure, but one that is commonly accepted.

The specific assumptions of the analysis include an assumption of equal variance-covariance matrices and a multivariate normal distribution.

These are both very robust and need not be adhered to rigorously (Klecka, 1975). In addition, Tatsuoka (1970) specifies three sample conditions:

1. The total sample size should be at least two or (preferably) three times the number of variables used
2. The size of the smallest group should be no less than the number of variables used
3. No individual in the sample should belong to more than one group

All of these conditions were met in the present study.

Results

One discriminant function was derived from the data. It was statistically significant (λ = .333, Wilk's lambda = .750, X^2 = 90.082, df = 31, $p < .0001$) and included thirty-one predictors. The overall multivariate F (approximate) was 3.199 (df = 31/298, $p < .0001$). Both the standardized and unstandardized discriminant vectors as well as the overall Wilk's lambda obtained at each step, its significance level and Rao's V, and the significance of the change in V are reported in Table 2. The canonical correlation for

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Place Table 2 about here

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the function was .499 while the obtained effect size was .247. The classification procedure utilizing the function classified correctly 70 percent of the cases. This was significant statistically (X^2 = 52.80, $p < .0001$). Three variables included in the original pool of items were not included in the stepwise results since their individual F values to enter the equation were overly small. A separate analysis forcing all the variables into the model without any stepwise inclusion indicated that the three excluded would not have

contributed to the function.

Those variables which accounted for a significant increase in the V statistic were then placed in a second discriminant analysis. Again, the function obtained was significant (λ = .296, Wilk's lambda = .771, X^2 = 83.759, df = 12, $p < .0001$) and included only twelve variables. The approximate multivariate F value was 7.820 (df = 12/317, $p < .0001$). Both the standardized and unstandardized discriminant vectors as well as the overall Wilk's lambda obtained at each step, its significance level and Rao's statistic, and the significance of the change in V are reported in Table 3. The canonical

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Place Table 3 about here

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correlation for the function was .478 and the obtained effect size was .225. The classification procedure correctly classified 67.9 percent of the cases and was statistically significant (X^2 = 42.194, $p < .0001$). All of the variables included in the analysis met the criteria for inclusion in the model. This later model was deemed more parsimonious than the earlier, thirty-one-item version and at the same time not significantly different in terms of variance accounted for or classificatory ability. Thus, the major portion of the interpretation of the data will be based upon the later, twelve item model. One should note that the major differences in the vectors of weights between the first and second versions is, of course, accounted for by the variation in size, type, and nature of included variables. Table 4 contains the classification values for both those who increased and those who decreased in apprehension using the twelve variable model.

Insert Table 4 about here

Discussion

Perhaps the best method of interpreting the results of the analysis completed and described above is via an examination of the means for the various significant discriminators and a discussion using an analogy to multiple regression. Thus Table 1 contains a listing of the mean values and standard deviations obtained for each predictor according to group membership. The regression analogy is best indicated by use of the standardized discriminant function reported in Table 3. The four largest contributors to the discriminant function are the individual's previous experience in oral communication activities, his or her satisfaction with the number of speeches assigned, the feeling of liking received from the instructor, and the reported understanding of the speech communication process. Individuals who experienced a reduction in apprehension over the semester indicated that they had less previous experience, were more satisfied with the number of speeches assigned, had instructors which they perceived liked them more, and understood the speech communication process better than those who experienced some increase. In addition, their fathers were perceived as talking more with people, their parents' income was lower, they experienced a greater change in success expectations over the semester, found academic success more important, and enjoyed competitive activities less. The remaining variables contributed less to prediction but still fell within the group of variables which discriminated. Individuals who reported a reduction had parents who talk with them more, talk slightly more with members of the opposite sex, and come from high school graduating classes which are larger.

A second way of interpretating the relative importance of the twelve items is to examine the univariate F ratio's for differences between individuals who increased and those who decreased. Table 5 provides a summary of each of the univariate tests. Obviously, the results mirror somewhat the interpretation based upon the discriminant function. The significant univariate differences include change in expectation (34), satisfaction with number of speeches (26), attitude of instructor (29), previous oral communication experience (11), understanding of the speech communication process (27), importance of academic success (33), enjoyment of competitive activities (10), and the amount one perceived his or her father to talk with other people (19).

Insert Table 5 about here

A general analysis of the significant variables reveals that classroom characteristics of the course, instructor, and materials as well as the student's own motivation to do well are important. Few of the family or background characteristics emerged clearly as discriminators. Why that is so is unclear. Perhaps the immediate classroom and academic concerns override these factors in importance in the college classroom.

Subsequent research should validate these results. Discriminant analysis has been used here as a descriptive statistical method. Research might also take the results reported here and use them in a predictive manner thus testing more fully the accuracy of the results. In addition, experimental studies might manipulate some of the important discriminators to verify their effects. Finally, it would clearly be advantageous to discover when in an academic period changes in apprehension take place. Plotting overall

apprehension levels over a semester may reveal some interesting effects, and one could both manipulate the order of material presentation as well as check for the effects of different topics and methods.

This study does answer the initial question; there are important differences between those who experience an increase in apprehension and those who experience a decrease. More specific prescriptive advice will have to await future research.

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TABLE 1

HYPOTHESIZED DISCRIMINATING VARIABLES

		Increase		Decrease	
		Mean	SD	Mean	SD
1.	Age: 1 = 18 or less; 2 = 19-20; 3 = 21-22; 4 = 23-26; 5 = 27 or older.	1.59	.75	1.70	.81
2.	Sex: 1 = Female; 2 = Male.	1.59	.50	1.57	.50
3.	Race: 1 = Black; 2 = Oriental; 3 = White; 4 = Other.	2.83	.58	2.93	.38
4.	Year in School: 1 = 1st semester freshman; 2 = 2nd semester freshman; 3 = 1st semester sophomore; 4 = 2nd semester sophomore; 5 = 1st semester junior; 6 = 2nd semester junior; 7 = 1st semester senior; 8 = 2nd semester senior; 9 = Other.	2.16	1.45	2.31	1.54
5.	Number of brothers and sisters: 1 = None; 2 = One; 3 = Two; 4 = Three; 5 = Four or more.	3.47	1.16	3.34	1.25
6.	Birth Order: 1 = oldest child; 2 = second oldest child; 3 = third oldest child; 4 = fourth oldest child; 5 = fifth oldest or more.	2.29	1.22	2.18	1.23
7.	Size of hometown: 1 = under 10,000; 2 = 10,000 to 50,000; 3 = 50,000 to 250,000; 4 = 250,000 to one million; 5 = over one million.	2.31	1.18	2.25	1.21
*8.	Size of high school graduating class: 1 = 50 or less; 2 = 50 to 150; 3 = 150 to 250; 4 = 250 to 500; 5 = over 500.	3.50	1.16	3.62	1.10
*9.	Income of your parents: 1 = well below the national average; 2 = slightly below average; 3 = average; 4 = above average; 5 = well above average.	3.53	1.03	3.45	.90
*10.	Degree to which you enjoy competitive activities: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little or none.	2.09	1.01	2.34	1.12
*11.	Experience you have had in oral communication activities: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little or none.	3.23	1.02	3.56	.98

TABLE 1 (continued)

	Increase		Decrease	
	Mean	SD	Mean	SD
12. Previous coursework you have had in oral communication: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little or none.	3.61	1.07	3.93	.98
13. Degree of oral communication your academic major requires: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little or none.	2.99	1.12	3.12	.99
14. How well you expect to do in COM 114: 1 = well above average; 2 = above average; 3 = average; 4 = below average; 5 = well below average.	2.07	.72	2.17	.78
15. Degree to which your parents encouraged you to communicate with them when you were a child: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.25	1.02	2.28	1.00
*16. Degree to which your parents encourage you to communicate with them now: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.07	1.03	2.17	1.09
17. Degree to which you communicated with your parents when you were a child: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.43	.98	2.32	.97
18. Degree to which you communicate with your parents now: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.32	1.08	2.27	1.10
*19. Degree to which your father enjoys talking with people: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.11	1.18	1.86	1.08
20. Degree to which your mother enjoys talking with people: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	1.88	.97	1.75	.90

TABLE 1 (continued)

		Increase		Decrease	
		Mean	SD	Mean	SD
21.	Degreee to which you interact with members of the same sex: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.21	.99	2.28	.93
*22.	Degree to which you interact with members of the opposite sex: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.36	1.06	2.38	1.00
23.	Number of interviews and small group experiences engaged in in this class: 1 = 0 or 1; 2 = 2 or 3; 3 = 4 or 5; 4 = 6 or 7; 5 = more than 7.	2.60	.93	2.62	.94
24.	Degree to which you were satisfied with the number of interviews and small group experiences: 1 = very satisfied; 2 = satisfied; 3 = both satisfied and dissatisfied; 4 = dissatisfied; 5 = very dissatisfied.	2.44	.85	2.18	.81
25.	Number of speeches required in this class: 1 = none; 2 = 1; 3 = 2; 4 = 3; 5 = more than 3.	3.82	.77	3.86	.75
*26.	Degree to which you were satisfied with the number of speeches in this class: 1 = very satisfied; 2 = satisfied; 3 = both satisfied and dissatisfied; 4 = dissatisfied; 5 = very dissatisfied.	2.58	.98	2.09	.88
*27.	Degree to which you believe you understand the nature of speech communication: 1 = a great deal; 2 = more than most; 3 = an average amount; 4 = less than most; 5 = very little.	2.42	.86	2.05	.76
28.	Degree to which this class helped you understand the nature of speech communication: 1 = a great deal; 2 = somewhat; 3 = a little bit; 4 = not very much; 5 = not at all.	2.26	1.10	1.81	.89

TABLE 1 (continued)

		Increase		Decrease	
		Mean	SD	Mean	SD
*29.	Degree to which you felt your instructor liked you: 1 = a great deal; 2 = more than average; 3 = average; 4 = less than average; 5 = very little.	2.85	.78	2.40	.82
30.	Degree to which you felt your fellow students liked you: 1 = a great deal; 2 = more than average; 3 = average; 4 = less than average; 5 = very little.	2.77	.58	2.64	.67
31.	How well you expect to do in COM 114: 1 = well above average; 2 = above average; 3 = average; 4 = below average; 5 = well below average.	2.15	.78	1.76	.66
32.	How well you expect to do academically at Purdue: 1 = well above average; 2 = above average; 3 = average; 4 = below average; 5 = well below average.				
*33.	How important it is for you to do well academically at Purdue: 1 = very important; 2 = important; 3 = both important and unimportant; 4 = unimportant; 5 = very unimportant.	1.92	.78	1.62	.81
*34.	Change in Expected Success: Item 31 minus Item 14.	.08	.90	-.41	.89

*Significant Predictors from Refined Discriminant Analysis.

TABLE 2

INITIAL DISCRIMINANT ANALYSIS

Item	Wilks lambda	p	Rao's V	p	Stand. Disc. Func. Coeff.	Unstand. Disc. Func. Coeffic.
29	.927	.00	25.818	.00	-.337	-.406
34	.883	.00	43.305	.00	-.225	-.243
26	.859	.00	53.648	.00	-.378	-.394
11	.835	.00	64.504	.00	.299	.296
27	.823	.00	70.520	.01	-.276	-.333
33	.812	.00	76.085	.01	-.194	-.241
10	.800	.00	81.887	.01	.174	.162
9	.794	.00	85.144	.07	-.259	-.269
19	.788	.00	88.137	.08	-.294	-.259
16	.781	.00	92.148	.04	.133	.126
22	.776	.00	94.526	.12	.135	.131
8	.771	.00	97.103	.10	.192	.170
3	.769	.00	98.671	.21	.138	.279
17	.766	.00	100.217	.21	-.233	-.239
5	.764	.00	101.416	.27	-.105	-.087
21	.761	.00	102.609	.27	.126	.131
1	.760	.00	103.557	.33	.166	.213
12	.758	.00	104.651	.30	.155	.149
20	.757	.00	105.417	.38	-.093	-.099
15	.755	.00	106.147	.39	.175	.173
24	.754	.00	106.971	.36	-.091	-.109
4	.753	.00	107.577	.44	-.104	-.070
30	.752	.00	107.959	.54	.083	.132
32	.752	.00	108.262	.58	-.061	-.241
28	.751	.00	108.470	.65	-.060	-.059
23	.751	.00	108.658	.66	.042	.046
18	.751	.00	108.795	.71	.063	.058
13	.751	.00	108.920	.72	-.034	-.033
25	.750	.00	109.028	.74	-.036	-.047
7	.750	.00	109.150	.73	-.038	-.032
14	.750	.00	109.185	.85	-.028	-.038

Unstandardized constant = 1.195

TABLE 3

REFINED DISCRIMINANT ANALYSIS

Item	Wilks	p	Rao's	p	Stand. Disc. Func. Coeff.	Unstand. Disc. Func. Coeff.
29	.927	.00	25.818	.00	.400	.482
34	.883	.00	43.305	.00	..212	.229
26	.859	.00	53.648	.00	.411	.428
11	.836	.00	64.504	.00	-.425	-.421
27	.823	.00	70.520	.01	.325	.392
33	.811	.00	76.085	.01	.275	.342
10	.800	.00	81.887	.01	-.208	.232
9	.793	.00	85.145	.07	.223	.231
19	.788	.00	88.137	.08	.260	.229
16	.781	.00	92.149	.04	-.181	-.171
22	.776	.00	94.525	.12	-.181	-.176
8	.771	.00	97.103	.10	-.167	-.148

Unstandardized constant = -1.808

TABLE 4

CLASSIFICATION FUNCTION COEFFICIENTS

Item	Increase	Decrease
34	-.8256	-1.0742
26	1.8159	1.3510
29	3.8063	3.2837
11	1.7471	1.1035
27	1.1546	.7287
33	2.2992	1.9282
10	1.9418	2.1521
9	4.7194	4.4681
16	.9407	1.1265
19	1.4637	1.2144
22	.6357	.8268
8	2.4316	2.5924
Constant	-32.0370	-30.0750

TABLE 5

F VALUES FOR UNIVARIATE ANALYSES
CONDUCTED ON PREDICTORS

Item	F	p
8	.951	.33
9	.549	.46
10	4.701	.03
11	9.171	.002
16	.691	.40
19	3.999	.04
22	.011	.91
26	22.403	.00001
27	17.861	.00001
29	25.818	.00001
33	11.143	.0009
34	24.833	.00001